AF Smart Operations

Five Desired Effects of AFSO

- Increase Airmen <u>Productivity</u>
- Increase Critical <u>Asset Availability</u>
- Improve Response Time & <u>Agility</u>
- Sustain <u>Safe & Reliable</u> Operations
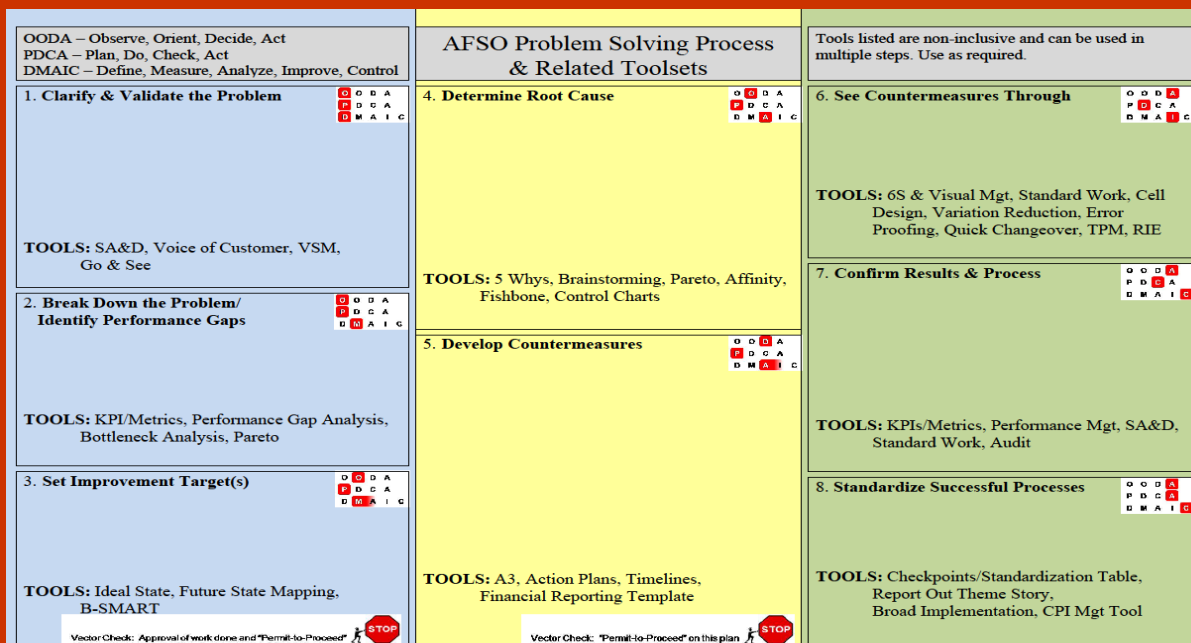- Improve <u>Energy Efficiency</u>

Lean - A systematic approach to identify waste, focus activities on eliminating it, and maximize resources to satisfy other requirements.

Six Sigma - A strategy that improves efficiency and effectiveness by eliminating variability, defects, and waste that undermine customer loyalty.

Theory of Constraints - A philosophy and a methodology for addressing logical thinking, scheduling and controlling resources, and measuring performance.

Balanced Scorecard - A strategic management system used to drive performance and accountability. Balances traditional performance measures with more forward-looking indicators. A useful strategic alignment and management tool.

Many problems can be solved by following a simple, standardized Process known as the Eight-Step Problem Solving methodology. Report results of Process Improvement efforts on the A3 Storyboard.

OODA – Observe, Orient, Decide, Act
PDCA – Plan, Do, Check, Act
DMAIC – Define, Measure, Analyze, Improve, Control

AFSO Problem Solving Process & Related Toolsets

Tools listed are non-inclusive and can be used in multiple steps. Use as required.

1. Clarify & Validate the Problem

TOOLS: SA&D, Voice of Customer, VSM, Go & See

2. Break Down the Problem/ Identify Performance Gaps

TOOLS: KPI/Metrics, Performance Gap Analysis, Bottleneck Analysis, Pareto

3. Set Improvement Target(s)

TOOLS: Ideal State, Future State Mapping, B-SMART

Vector Check: Approval of work done and "Permit-to-Proceed" STOP

4. Determine Root Cause

TOOLS: 5 Whys, Brainstorming, Pareto, Affinity, Fishbone, Control Charts

5. Develop Countermeasures

TOOLS: A3, Action Plans, Timelines, Financial Reporting Template

Vector Check: "Permit-to-Proceed" on this plan STOP

6. See Countermeasures Through

TOOLS: 6S & Visual Mgt, Standard Work, Cell Design, Variation Reduction, Error Proofing, Quick Changeover, TPM, RIE

7. Confirm Results & Process

TOOLS: KPIs/Metrics, Performance Mgt, SA&D, Standard Work, Audit

8. Standardize Successful Processes

TOOLS: Checkpoints/Standardization Table, Report Out Theme Story, Broad Implementation, CPI Mgt Tool

AFSO is a mindset to attack problems and identify opportunities for improvement. It emphasizes our greatest resource — our innovative, dedicated Airmen.

AFSO principles and tools enable Airmen to change the day-to-day operating style to integrate continuous improvement into the full spectrum of Air Force operations. Even good processes can be made better.

Roles and Responsibilities

Champion: The individual within an organization with the authority to commit and dedicate resources, assets, and people, and to charter new initiatives. Charged with primary responsibility for creating the vision and leading an organization based on their strategic view of his/her organization. Champions guide CPI initiatives through critical understanding of how the organization fits into the enterprise at large.

Process Owner: An individual with the authority and responsibility for leading an organization or group. Often responsible for developing the organizational strategic plan, however, in smaller organizations, they may execute plans prepared at a higher level. Process Owner's have the ability to directly affect all that happens within their sphere of influence relative to the specific process and will have varying amounts of influence with process owners that provide inputs or that receive their outputs. Distinctly different from Champions who have organizational authority over multiple process owners.

Team Leader: An individual within an organization familiar with the process and it's stakeholders responsible for moving a team to accomplish a task. The Team Leader functions primarily as a coordinator, and serves as the link between the team members, the sponsor and the rest of the organization by coordinating team activities and maintaining all team documentation.

Facilitator: Consultant, advisor, or subject matter expert that leads or drives the pace and direction of a group participation event. Green Belt facilitators handle Squadron and smaller-sized organizational problems while Black Belt facilitators tackle problems impacting Group and larger-sized organizations.

OBSERVE, ORIENT, DECIDE, ACT

Cause & Effect/Fishbone Diagram — To help push beyond symptoms to uncover potential root causes.

1. Place the problem statement in a box on the right-hand side of a writing surface.

2. Draw major cause categories or steps in the process. Connect them to the "backbone" of the fishbone chart.

3. Place brainstormed causes in the appropriate category.

4. Ask repeatedly of each cause listed either "Why does this happen?" or "What could happen?".
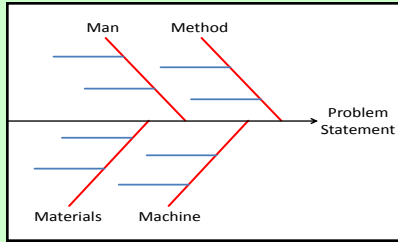
Control Chart — A tool to determine if a process is in a state of statistical control or not; if not, the pattern can help determine the source of variation to be eliminated.

A control chart consists of the following:

1. Points representing averages of measurements of a quality characteristic in samples taken from the process versus time.

2. A center line, drawn at the process mean.

3. Upper and lower control limits that indicate the threshold at which the process output is considered statistically unlikely.
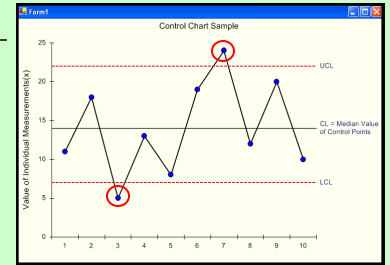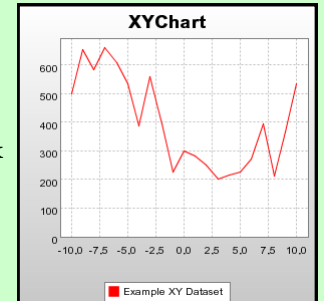
Affinity Diagram — To organize facts, opinions, and issues into natural groups to help diagnose a complex situation or find themes.

1. Gather ideas from brainstorming session.

2. Write ideas on cards or self-stick notes.

3. Allow people to group the cards or notes.

4. When the clustering is done, create a "header" label for each group

5. Complete the diagram and discuss the results
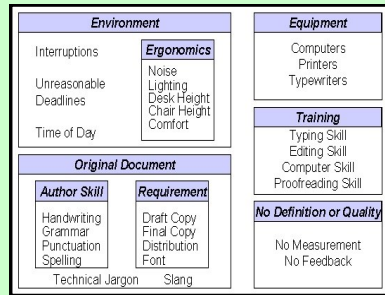
Time Series Plots (run chart) — To show data points in the order in which they occurred; to show if the process is changing over time.

1. Collect data and be sure to track the order in which the data were generated by the process.

2. Mark off the data units on the vertical (y) axis and mark the sequence or time on the horizontal (x) axis.

3. Plot the data points on the chart and draw a line connecting them is sequence.
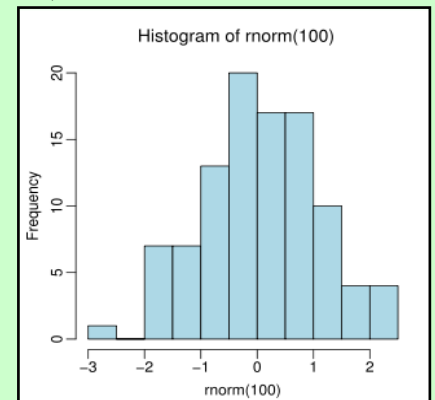
Scatter Plots — Represents the association between two variables; can show relationships such as positive (rising), negative (falling), and neutral relationships.

1. Collect paired data.

2. Determine appropriate measures and increments for the axes on the plot.

3. Plot the points on the chart.

4. Interpret the data.

   Positive correlation, no correlation, negative correlation.

Descriptive Statistics — Represent a characteristic of a large group of observations.

1. Measures of central tendency (mean, median, mode)

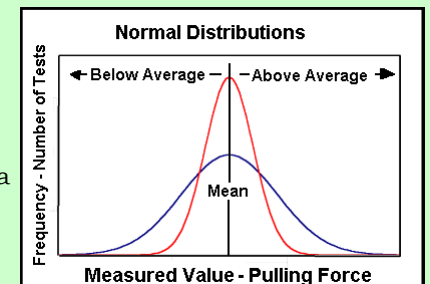2. Measures of spread (range, variance, standard deviation)

Frequency plot (histogram) - to evaluate the distribution of a set of data.

1. Take the difference between the min and max values to get the range of observed values.

2. Divide the range into evenly spaced intervals.

3. Count the number of observations in each interval.

4. Create bars whose heights represent the count in each interval.

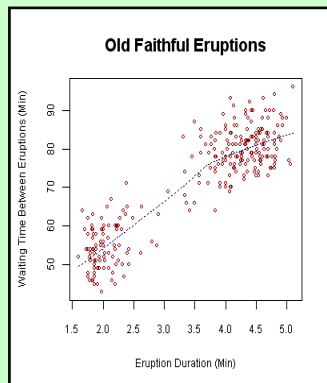**Normal distribution**— describes the properties of the "normal" or "bell-shaped" distribution.

1. A normal random variable Z that has a mean of 0 and standard deviation of 1.

Correlation — Used to indicate whether there is a relationship between the values of different measurements.

1. Positive correlation—higher values of one measurement are associated with higher values of the other measurement

2. Negative correlation—higher values of one measurement are associated with lower values of another

3. Pearson correlation coefficient (r) - reflects the strength and the direction of the relationship.

OBSERVE, ORIENT, DECIDE, ACT

Five Principles of Lean

1. Specify what creates value from the customer's perspective
2. Identify all the steps along the process chain
3. Make all the process "flow"
4. Produce only what is "pulled" by the customer
5. Strive for perfection by continually removing waste

S	I	P	O	C
Suppliers	**Inputs**	**Process**	**Outputs**	**Customer**
Who provides those inputs?	What inputs are needed to create the outputs?	What processes are you bound by, that you must change to change a process?	What do your internal / external customers need from you?	To whom do you provide product, info, or service? Internal and external.

Flow Chart — A schematic representation of a process; identifies the actual flow or sequence of events in a process.

1. Review process being studied.
2. Identify the steps in the process.
3. Arrange the steps in order.
4. Discuss the results, adjust as needed.
5. Number the tasks sequentially.
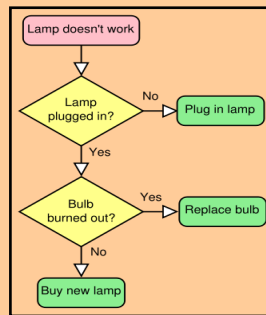
Capabilities and Competencies

- SWOT Analysis—a strategic planning tool used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project.
- Internal factors—strengths/weaknesses internal to the organization.
- External factors—opportunities/threats presented by the external environment.
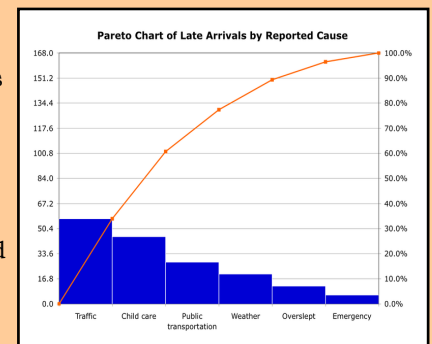- Four key areas to consider: Managerial, Marketing, Financial, & Technical.

8 Types of Waste: Waste is anything that adds cost or time without adding value (DOWNTIME).

1. **D**efects—having a direct impact on the bottom line, quality defects resulting in rework or scrap
2. **O**verproduction—to produce an item before it is actually required
3. **W**aiting—whenever goods are not moving or being processed
4. **N**on-Standard over-processing—using expensive high precision equipment where simpler tools would be work
5. **T**ransportation—moving product between processes or locations
6. **I**ntellect—failure to fully use time and talent of people
7. **M**otion—related to ergonomics: bending, stretching, walking, lifting, and reaching
8. **E**xcess Inventories—stockpiles of both in-process and finished goods

Pareto Chart — A bar chart where the values being plotted are arranged in descending order; the purpose is to highlight the most important among a set of factors.

1. Collect data on different types or categories of problems.
2. Tabulate scores.
3. Sort the problems by frequency or by level of impact.
4. Draw a vertical axis and divide into increments equal to the total number you observed.
5. Draw bars for each category, starting with the largest and working down.
6. Interpret the results.

Non-Value-Added—any activity that takes time, material or space, but does not add value to the product or service from the customer's perspective. For example, inspections or reviews normally are non-value-added because they are checking to see whether the work was done right in the first place. A non-value-added process step violates at least one of the following criteria: the customer is willing to pay for this activity, or it must done right the first time.

Value-Added—the parts of the process that add worth to the customer's product or service. To be considered value added, the action must meet all three of the following criteria: the customer is willing to pay for this activity, it must be done right the first time, the action must somehow change the product or service in some manner.

OBSERVE, ORIENT, DECIDE, ACT

Brainstorming — To provide a group with a wide range of ideas around a topic.

1. Review the problem definition.
2. Clarify the goal/question and provide any relevant information.
3. Give everyone a few minutes to think about the question and individually write down some ideas.
4. Gather ideas.
5. Consolidate similar ideas (affinitize) and discuss the complete set of ideas.

Risk Analysis — Process of assessing, communicating, and managing the consequences of unfavorable events.

1. Quantitative Risk Analysis—creating a mathematical model that calculates the impact of uncertain parameters and decisions we make on outcomes that are important to the organization. R=PC (risk = probability + consequences).
2. Models and Simulation—use of experiments to replicate real world events.
3. Monte Carlo Simulation—use of random sampling in mathematical models to conduct quantitative risk analysis.

Risk Ranking Matrix

Likelihood	Negligible	Minor	Major	Severe	Disastrous
Frequent					
Likely			Significant Risk		
Unlikely					
Rare	Insignificant Risk				
Extraordinary					

Severity

Improvement Target B-SMART characteristics

- **Balanced** – Ensure goals are balanced across the multiple fronts of organizational output and multiple targets
- **Specific** – Have desirable outputs that are based on subject matter expert knowledge and experience and are applicable to the process improvement activity
- **Measurable** – Includes time frames and have data that is obtainable from specific sources
- **Attainable** – Resources are available; may have some risk, but success is possible
- **Results Focused** – Link to the mission, vision, and goals and are meaningful to the user
- **Timely** – Provide step-by-step views versus giant leaps

CPI-Management Tool (CPI-MT)

A secure, web-based, searchable and collaborative IT environment that is accessible by anyone, anywhere, to manage CPI efforts across the Air Force. CPI-MT provides:

- Project Management: Create, manage, analyze, process, control, and report Process Improvement Project information
- Strategic Alignment: Align Process Improvement Projects to AF Key Process
- Executive Visibility: Provide management dashboards for enterprise awareness
- Reporting: Provide automated report delivery system
- Auditing: Provide information for analysis and audit

Five Why's — A method for pushing people to think about root causes.

1. Select any cause. Make sure everyone has a common understanding of what that cause means. ("Why 1")
2. Ask "why does this outcome occur"? (Why 2)
3. Select one of the reasons for Why 2 and ask "why does that occur"? (Why 3)
4. Continue in this way until you feel you've reached a potential root cause, or can's ask any more Whys.

Multivoting — A quick technique for identifying priorities or narrowing down the options from a list of ideas.

1. Number every idea or option being considered.
2. Write each idea on a flip chart or whiteboard visible to all participants.
3. Decide how many votes each person should have (N/3)
4. Cast votes.
5. Count votes.
6. Decide on a course of action.

Six "S" — A basic, fundamental, systematic approach for productivity, quality, and safety improvement.

- **Sort** – The first step in cleaning and organizing. Sort through everything in the work are and keep only what is necessary by discarding items that are not used.
- **Straighten** – Organize, identify, and arrange everything in a work area. There should be a place for everything and everything in its place, with everything properly identified and labeled.
- **Shine** – Regular, usually daily, cleaning and maintenance. Inspect everything while cleaning, including machines, tools, equipment, and supplies.
- **Standardize** – Make it easy to maintain - simplify and standardize. Standardize when the fastest, safest, best quality, repeatable steps have been identified.
- **Sustain** – Continue to train and maintain the standards. Establish a formal system for monitoring the results of Six S.
- **Safety** – Make sure that no improvement to the workplace is operating in a way that decreases the level of safe operation in the area.

Air Education & Training Command AFSO

True quality is embodied in the actions of Air Force people who take decisive steps to improve processes and products; who capitalize on quality as a leverage tool to enhance products, achieve savings, and improve customer service; and who exemplify our core values of integrity first, service Before self, and excellence in all we do. — General Fogleman